MIL-HDBK-217 Revision Status

Parts Standardization & Management Committee

October 30, 2008

Flight Systems Division
Crane Division, Naval Surface Warfare Center (NSWC Crane)

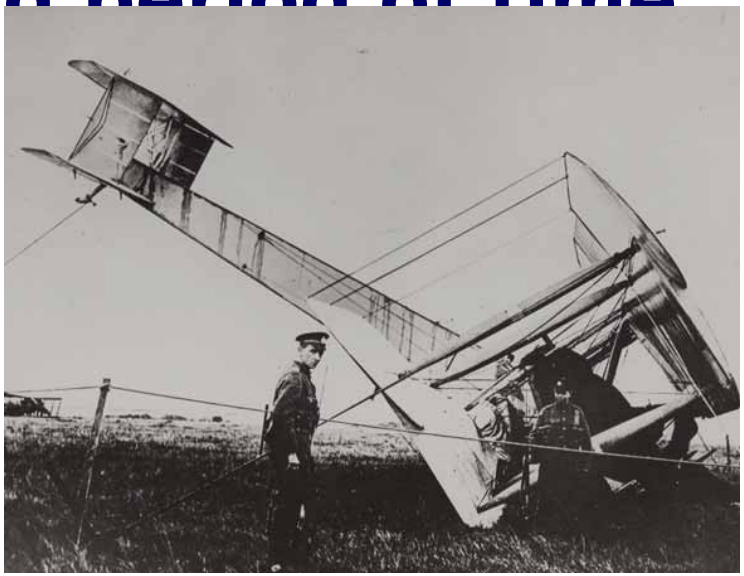
Harnessing the Power of Technology for the Warfighter

Outline

- **What an Why of Reliability**
- **MIL-HDBK-217 Background**
- **Scope of MIL-HDBK-217**
- **MTBF Survey**
- **217 Revision Phase 1 Overview**
- **217 Revision Phase 2 Overview**
- **Conclusion**

What is Reliability?

- **The probability of performing a specified function without failure under given conditions for a specified period of time**



(source: Curtiss-Wright Controls)

Why Do We Need Reliability?

- Improve the design of a product
- Reduce life cycle cost
- Logistics spares
  - How many do we need?
- Reliability can mean life to the War Fighter
  - When they squeeze the trigger or push the button they want to hear a "**BANG**" not a "*click*"
- Through the analysis of historical failure data, mathematical models were derived for determining component failure rates

MIL-HDBK-217 Background

- **MIL-HDBK-217 was the original reliability prediction tool**
  - **Developed by Rome Laboratory, published by DoD 1961**
- **World-wide known and accepted**
  - **Still widely used by commercial companies, defense industry, government organizations**
- **Currently an active Military Handbook**
  - **Latest revision is MIL-HDBK-217F Notice 2, dated 28 Feb 1995**
- **Preparing Activity responsibility was transferred from the Air Force (AF-11, Aeronautical Systems Center) to the Navy (Navy-NW, NSWC Crane) on 21 Feb 2001**

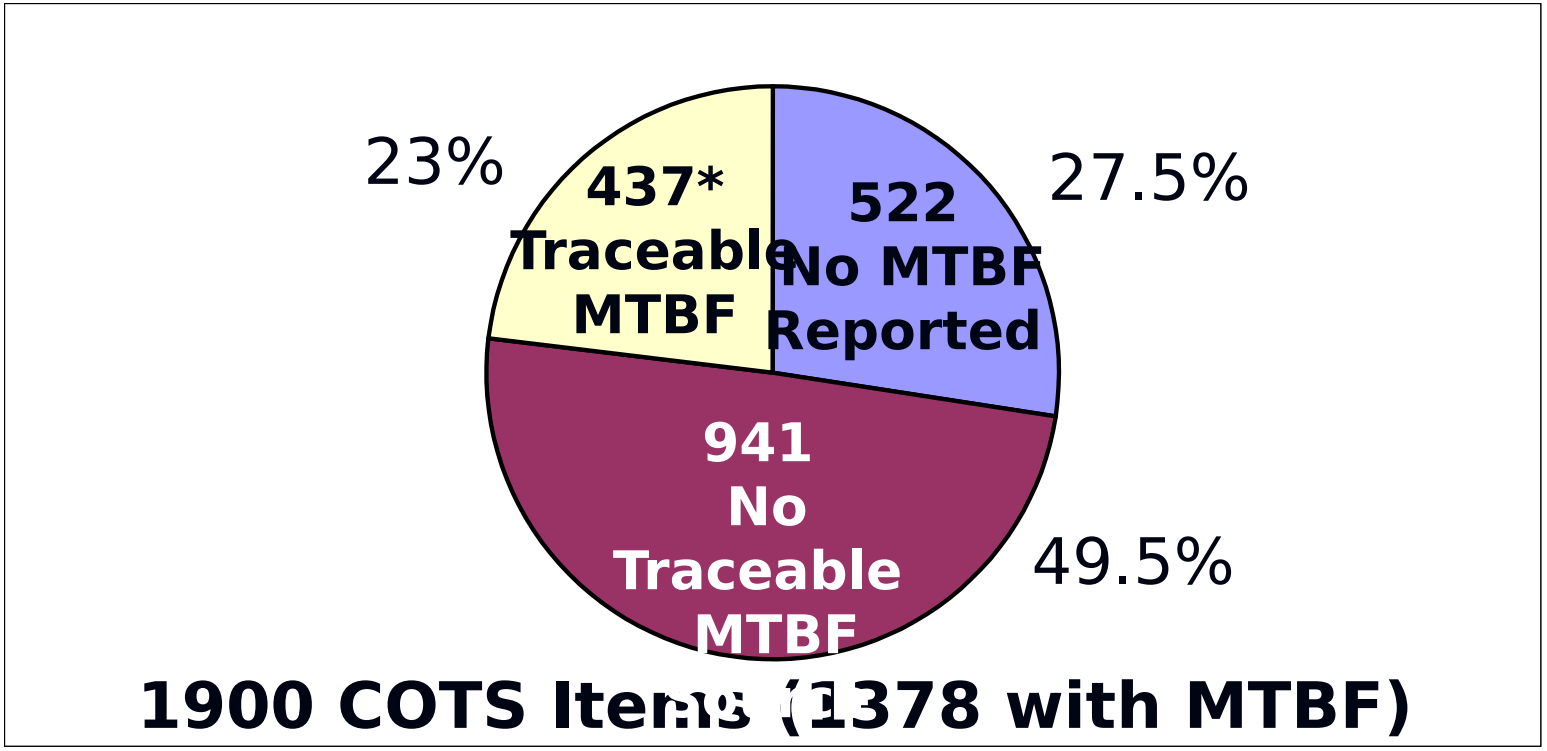
MIL-HDBK-217 Scope

"The purpose of this handbook is to establish and maintain *consistent and uniform* methods for estimating the inherent reliability of military electronic equipment and systems. It provides a *common basis for reliability predictions during acquisition* programs for military electronic systems and equipment. It also establishes a common basis for *comparing and evaluating reliability predictions* of related or competitive designs. The handbook is intended to be used as a tool to increase the reliability of the equipment being designed."

Traceable MTBF Survey

- **Mean Time Between Failure (MTBF)**
- **Study Initiated in 2004**
  - **NSWC Crane was tasked by the Defense Standardization Program Office (DSPO) to assess the "Feasibility of Standardizing COTS Module Reliability Predictions"**
- **Conclusions**
  - **Mil-HDBK-217 still being used as a primary source to calculate MTBF**
  - **There is a significant lack of consistency and control in calculating MTBF (not standardized)**

Traceable MTBF Survey Cont.



*** Less than 25% of items surveyed had published and traceable MTBF numbers!**

Why Revise 217?

- **217 is still the most widely known and used reliability prediction tool**
  - **A majority of practitioners are still using MIL-HDBK-217 and want to continue to use it**
- **Would help to eliminate, or at least reduce the number of people questionably modifying 217**
- **Would maintain a relatively simple prediction method**
- **Most users surveyed would like to see an revision**

MIL-HDBK-217 Revision

- **Direction from DSPO, Greg Saunders**
- **Lead Standardization Activity is OUSD(AT&L), Defense Systems/SSE/ED**
- **NSWC Crane Division as the Preparing Activity will revision 217 to rev. “G”**
- **MIL-HDBK-217 DoD custodians and reviewers**
- **Working group to perform the revision**
  - **Consists of government and industry**
- **Received Formal Request Letter From DSPO to revise 217** (27SEP07)

Phase 1 Revision

- **Phase 1 Started Dec, 2007 (2 year task)**
- **End product of the task is MIL-HDBK-217 Revision G**
  - **Update will include a refresh of the data to make 217 current with today's part technologies**
  - **Models will be reviewed and modified if needed, but generally would remain intact**
  - **Update will not be a new reliability prediction approach**
  - **Goal is for 217 update to look and work as it does today**

Accomplishing the Revision

- **Developed a Questionnaire to collect information/volunteers from the Reliability community**
  - **130 Questionnaires Returned**
  - **45 Volunteers for Working Group**
  - **84 Volunteers to Review**
- **Formed a 217 Working Group of Government and Industry (spring 2008)**
  - **NSWC Crane, NAVAIR, Wright Pat. AF, DLA, Sandia**
  - **Boeing, Raytheon, Lockheed Martin, Honeywell, BAE, RiAC, ReliaSoft, RELEX**
- **Conducted First Working Group Meeting**
  - **7,8 May 2008**
  - **Indianapolis, IN**
  - **20 Attendees**

Accomplishing the Revision Cont.

- **Conduct monthly WebEx**
  - **2 hour meeting**
  - **Review status, questions, issues**
  - **Review sections when appropriate**
- **Conduct quarterly face-to-face meetings**
  - **2-day meeting**
  - **Review work completed to date of each section**
  - **Address any questions, issues**
- **Website Developed for Working Group**
    - **IEEE Hosted**

Accomplishing the Revision Cont.

- **Overall the proposed approach is a divide-and-conquer concept**
  - **Asking everyone how they would like to contribute**
  - **Data (Top Priority)**
    - **Can offer data from any part type to the working group to use**
  - **Assign an individual to a section of MIL-HDBK-217**
    - **Basically the individual would be responsible for executing the revision for the part type identified in the section**
      - Perform the revision and present back to the working group for comment / concurrence
    - **Responsible individual is free to conduct the revision of their section as they feel is best**
      - Perform the work themselves or enlist others
    - **Individuals having an assigned section will be provided with potential sources of help identified in responses to questionnaire**
    - **Plan is for a lot of the work pertaining to the part sections be accomplished “behind the scenes”**

Data Collection

- **Addressed Data Collection**
  - **Top Priority**
  - **Flyer** (Attachment)
    - RiAC Newsletter
    - IEEE Newsletter
    - International Applied Reliability Symposium (17-19JUN 08)
  - **Presentation to JEDEC G-11 & G-12** (23-24 SEPT 08)
  - **Requesting field failure return or test data**
    - Component Manufacturers
    - System integrators
    - Others

Data Collection Cont.

- **RiAC Process all Data**
  - **Sanitize data (protect source of data)**
  - **Dave Nicholls, RIAC**
- **Overview of data handling and process**
  - **Collection**
  - **Evaluation**
  - **Processing**

Phase 2 Revision

- **Developing concurrent with Phase 1**
- **Outline of task**
  - **Determine current needs**
    - **Beyond MIL-HDBK-217 Rev G**
  - **Survey Current Reliability Methodologies**
    - **217 Plus**
    - **Telcordia**
    - **Others**
  - **Evaluate Current Initiatives**
    - **Aerospace Vehicle Systems Institute (AVSI)**
    - **IEEE 1413 revision**
  - **Strengths/Weakness Assessment of each**

Phase 2 Revision Cont.

- **Develop Approach**
  - **Where do we go from here?**
  - **Compile Needs**
    - **MIL-HDBK-217 Appendix B**
      - » Current Technology Failure Mechanisms
    - **Community Acceptance**
    - **Long range reliability goals**
- **Develop Recommendations for the future**

Preparing Activity POC's

- **Lead**
  - ***Phone:*** **(812) 854-2398**
- **Alternate**
  - ***Phone:*** **(812) 854-2443**
- **Support**
  - ***Phone:*** **(812) 854-1797**

Conclusion

- **Any Questions?**